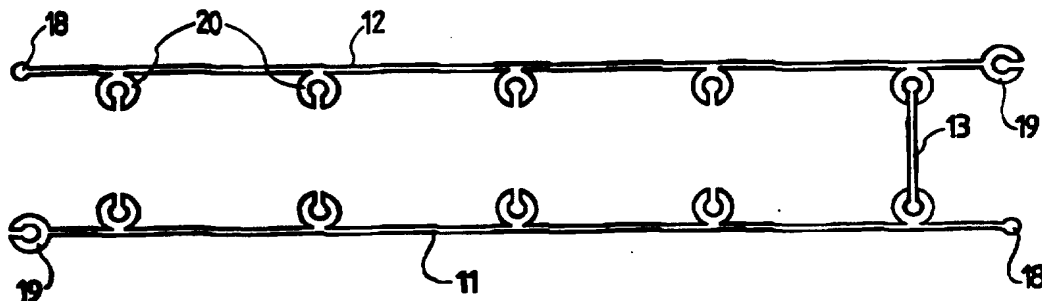


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(21) International Application Number: PCT/AU95/00576 (22) International Filing Date: 5 September 1995 (05.09.95) (30) Priority Data: PM 7881 5 September 1994 (05.09.94) AU (71)(72) Applicant and Inventor: STERLING, Robert [AU/AU]; 71 Billabirra Crescent, Nerang, QLD 4211 (AU). (74) Agent: INTELLPRO; G.P.O. Box 1339, Brisbane, QLD 4001 (AU).		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published With international search report. With amended claims.

(54) Title: BUILDING PANEL**(57) Abstract**

A panel assembly (10) comprising back-to-back sheets (11 and 12) with the sheets (11) being in edge abutting relation and the sheets (12) being in edge abutting relation. The sheets are interconnected by ties (13) with the tie (14) being shown slid out a small amount to illustrate the slide in action of the ties into operative position. Each panel includes an edge connector so that adjacent panels can be connected together. The edge connectors are shown generally at (15) and in this case involve a slide in action between co-operating male and female connectors.

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BUILDING PANEL

FIELD OF THE INVENTION

THIS INVENTION relates to a building panel and in particular but not limited to building panels for either walls, roof or flooring involving the use of material layed while wet and allowed to harden and in particular but not limited to wall panels having a concrete core and a plastics form.

OUTLINE OF THE INVENTION

In one aspect, the present invention resides in an extruded, thin plastics sheet having front and rear faces between opposed side edges, each side edge having edge connector means so that sheets can be connected together, the rear face having spaced tie attachment means so that the sheet can be tied to and spaced from a support by ties attached to the tie attachment means and bridging across to the support. The support is typically another sheet.

In another aspect, the present invention resides in a panel assembly comprising back-to-back, thin extruded plastic sheets, each sheet having a front and rear face between opposed side edges, each side edge having edge connector means so that the sheets can be connected to adjacent sheets, the rear faces of each sheet being in opposed confronting relation and each rear face having spaced tie attachment means, ties attached to the tie attachment means of the respective sheets and bridging between the sheets to hold them together and in spaced relation, material layed while wet and allowed to harden, providing a core between the sheets. The sheets are typically 3mm to 8mm thick and made from a rigid plastic.

In a preferred form of the invention, a panel of at least two sheets are employed, with the sheets being back-to-back and in spaced relation with ties bridging between the sheets and the wet material, typically a concrete mix is poured between the sheet and allowed to harden, the tie attachment means serving to anchor the sheets in the hardened material.

The edge connector means preferably comprises co-operating male and female connectors that engage with a slide action or a hand insertable clip action. Typically, one edge connector is an edge bead having a generally part circular cross section while the other connector is typically a generally C-shaped receiver

which holds the edge bead captive.

The tie attachment means is typically a projection having an undercut section serving to anchor the projection in the hardened material. Preferably, the tie attachment means is also a generally C-shaped receiver.

5 The ties are typically plastic strips having opposed edges carrying a connector adapted to co-operate with the tie attachment means, each edge of the strip preferably being an edge bead of generally part circular cross section adapted to be held captive in the C-shaped receiver. The ties typically vary in width according to the desired thickness of the finished panel. The ties are typically located at intervals of 8cm to 25cm with about 16cm between ties being preferable. The tie connection means and ties preferably engage by a slide in action or a hand insertable clip action.

Each tie is preferably spaced both longitudinally and laterally from other ties so that the hardened material extends continually throughout the core.

15 BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention can be more readily understood and be put into practical effect, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the present invention and wherein:-

20 Figure 1 is a perspective view of a panel assembly according to the present invention;

Figure 2 is a section through a typical panel assembly;

Figures 3 to 5 are sections through typical ties; and

Figures 6 to 10 illustrate a further embodiment of the invention.

METHOD OF PERFORMANCE

25 Referring to the drawings and initially to Figure 1, there is illustrated a panel assembly 10 comprising back-to-back sheets 11 and 12 with the sheets 11 being in edge abutting relation and the sheets 12 being in edge abutting relation. The sheet are interconnected by ties 13 with the tie 14 being shown slid out a small amount to illustrate the slide in action of the ties into operative position.

30 Each panel includes an edge connector so that adjacent panels can be connected together. The edge connectors are shown generally at 15 and in this case involve a slide in action between co-operating male and female connectors.

The ties 13 also co-operate with tie attachment means so that the ties slide into place, again employing co-operating male and female connectors.

It will be appreciated that the panel arrangement illustrated in Figure 1 can be simply put together and that a concrete mix can be poured into the space 16 and as can be seen, the ties included gaps 17 typically as illustrated in the cut away section so that the concrete inside the panel is not partitioned but extends and flows as a single structure between all panels.

Referring now to Figures 2 to 5, there is illustrated in section, a typical panel and where appropriate, like numerals have been used to illustrate like features. As can be seen, the edge connectors, in each case, include a generally circular beading 18 at one end and a C-shaped channel 19 at the other end while the tie connectors on the rear of the panels employ similar C-shaped connectors 20 and there is illustrated a typical example of a tie 14 bridging between the panels. The ties illustrated in Figures 3 to 5 are simply to illustrate different panel thicknesses that can be employed in typical applications.

Referring to Figures 6 to 10 there is illustrated a further embodiment where the basic panel configuration is the same but the connectors differ. As can be seen panels 30 and 31 are interconnected by spaced ties 32. The ties 32 include female connectors 33 having adjacent longitudinally extending flanges 33 adhered to the inner surface 34 of the panels 30 and 31 thereby strengthening the connection. Projecting male connectors in the form of longitudinally extending beads 35 of arrowhead shaped profile clip or slide into the female connectors each connector possessing co-operating shoulders so that the connectors are held captive against transverse movement once engaged. The edges 36 and 37 of the panels have co-operating male and female connectors which operate in a similar fashion as is more clearly seen in Figures 8 and 10. As in the previous embodiments the ties can be of different widths for different applications.

Of course it will be appreciated that any suitable panel thickness can be used depending upon requirements. Materials used are typically virgin plastics for the panels and recycled plastics for the ties.

Whilst the above has been given by way of illustrative example of the present invention, many variations and modifications thereto will be apparent to

those skilled in the art without departing from the broad ambit and scope of the invention as set forth in the appended claims.

CLAIMS

1. An extruded, thin plastics sheet having front and rear faces between opposed side edges, each side edge having edge connector means so that sheets can be connected together, the rear face having spaced tie attachment means so that the sheet can be tied to and spaced from a support by ties attached to the tie attachment means and bridging across to the support.
2. A panel assembly comprising back-to-back, thin extruded plastic sheets, each sheet having a front and rear face between opposed side edges, each side edge having edge connector means so that the sheets can be connected to adjacent sheets, the rear faces of each sheet being in opposed confronting relation and each rear face having spaced tie attachment means, ties attached to the tie attachment means of the respective sheets and bridging between the sheets to hold them together and in spaced relation, material layed while wet and allowed to harden, providing a core between the sheets.
3. A panel of at least two sheets with the sheets being back-to-back and in spaced relation with ties bridging between the sheets and material layed between the sheet while wet and allowed to harden, tie attachment means bridging between the sheets serving to anchor the sheets in the hardened material.
4. The invention according to claims 1, 2 or 3 wherein the edge connector means comprises co-operating male and female connectors that engage the sheets with a slide action or a hand insertable clip action.
5. The invention according to claim 1 or claim 2 wherein one edge connector is an edge bead having a generally circular or part circular cross section while the other connector is typically a generally C-shaped receiver which holds the edge bead captive.
6. The invention according to claim 1 or claim 2 wherein the tie attachment means is a projection having an undercut section serving to anchor the projection in the hardened material.
7. The invention according to claim 6 wherein the tie attachment means is a generally C-shaped receiver.
7. The invention according to claim 1 wherein The ties are plastic strips having opposed edges carrying a connector adapted to co-operate with the tie

attachment means, each edge of the strip being an edge bead of generally part circular cross section adapted to be held captive in a C-shaped receiver.

8. The invention according to claim 1 or claim 7 wherein the tie attachment means and ties engage by a slide in action or a hand insertable clip action.

9. The invention according to claim 1 wherein each tie is spaced from adjacent ties both longitudinally and laterally.

10. The invention according to claim 7 or claim 8 wherein the ties are spaced from one another both longitudinally and laterally.

11. The invention according to claim 1 wherein the tie attachment means comprises co-operating longitudinally extending male female connectors and a longitudinally extended flange adhered to the panel and extending generally parallel to the male female connectors.

12. The invention according to claim 1 wherein the tie attachment means comprises male-female connectors having co-operating shoulders inhibiting relative transverse movement of the connectors once connected.

13. The invention according to claim 1 wherein the panels include tie attachment mean comprising a longitudinally extending male connectors having an arrowhead shaped profile and the ties include a female connector co-operating with the made connector.

[received by the International Bureau on 12 February 1996 (12.02.96); original claims 1-3 and 5-11 amended; remaining claims unchanged (2 pages)]

1. An extruded, thin plastics sheet having front and rear faces between opposed side edges, each side edge having edge connector means so that sheets can be connected together, the rear face having spaced tie attachment means so that the sheet can be tied to and spaced from a support by ties attached to the tie attachment means and bridging across to the support, said tie attachment means comprising co-operating longitudinally extending male female connectors and a longitudinally extended flange adhered to the panel and extending generally parallel to the male female connectors.
2. A panel assembly comprising back-to-back, thin extruded plastic sheets, each sheet having a front and rear face between opposed side edges, each side edge having edge connector means so that the sheets can be connected to adjacent sheets, the rear faces of each sheet being in opposed confronting relation and each rear face having spaced tie attachment means, ties attached to the tie attachment means of the respective sheets and bridging between the sheets to hold them together and in spaced relation, material layed while wet and allowed to harden, providing a core between the sheets, said tie attachment means comprising co-operating longitudinally extending male female connectors and a longitudinally extended flange adhered to the panel and extending generally parallel to the male female connectors.
3. A panel of at least two sheets with the sheets being back-to-back and in spaced relation with ties bridging between the sheets and material layed between the sheet while wet and allowed to harden, tie attachment means bridging between the sheets serving to anchor the sheets in the hardened material, said tie attachment means comprising co-operating longitudinally extending male female connectors and a longitudinally extended flange adhered to the panel and extending generally parallel to the male female connectors.
4. The invention according to claims 1, 2 or 3 wherein the edge connector means comprises co-operating male and female connectors that engage the sheets with a slide action or a hand insertable clip action.
5. The invention according to claim 1 or claim 2 wherein one edge connector is an edge bead having a generally circular or part circular cross section while the other connector is [typically] a generally C-shaped receiver which holds the edge bead captive.
6. The invention according to claim 2[1] or claim 3[2] wherein the tie attachment means is a projection having an undercut section serving to anchor the projection in the

hardened material.

7. The invention according to claim 6 wherein the tie attachment means is a generally C-shaped receiver.

8.[7.] The invention according to claim 1 wherein t[T]he ties are plastic strips having opposed edges carrying a connector adapted to co-operate with the tie attachment means, each edge of the strip being an edge bead of generally part circular cross section adapted to be held captive in a C-shaped receiver.

9.[8.] The invention according to claim 1 or claim 7 wherein the tie attachment means and ties engage by a slide in action or a hand insertable clip action.

10.[9.] The invention according to claim 1 wherein each tie is spaced from adjacent ties both longitudinally and laterally.

11.[10.] The invention according to claim 7 or claim 9[8] wherein the ties are spaced from one another both longitudinally and laterally.

12.[11.] The invention according to claim 1 wherein the tie attachment means comprises co-operating longitudinally extending male female connectors and a longitudinally extended flange adhered to the panel and extending generally parallel to the male female connectors].

12. The invention according to claim 1 wherein the tie attachment means comprises male-female connectors having co-operating shoulders inhibiting relative transverse movement of the connectors once connected.

13. The invention according to claim 1 wherein the panels include tie attachment mean comprising a longitudinally extending male connectors having an arrowhead shaped profile and the ties include a female connector co-operating with the made connector.

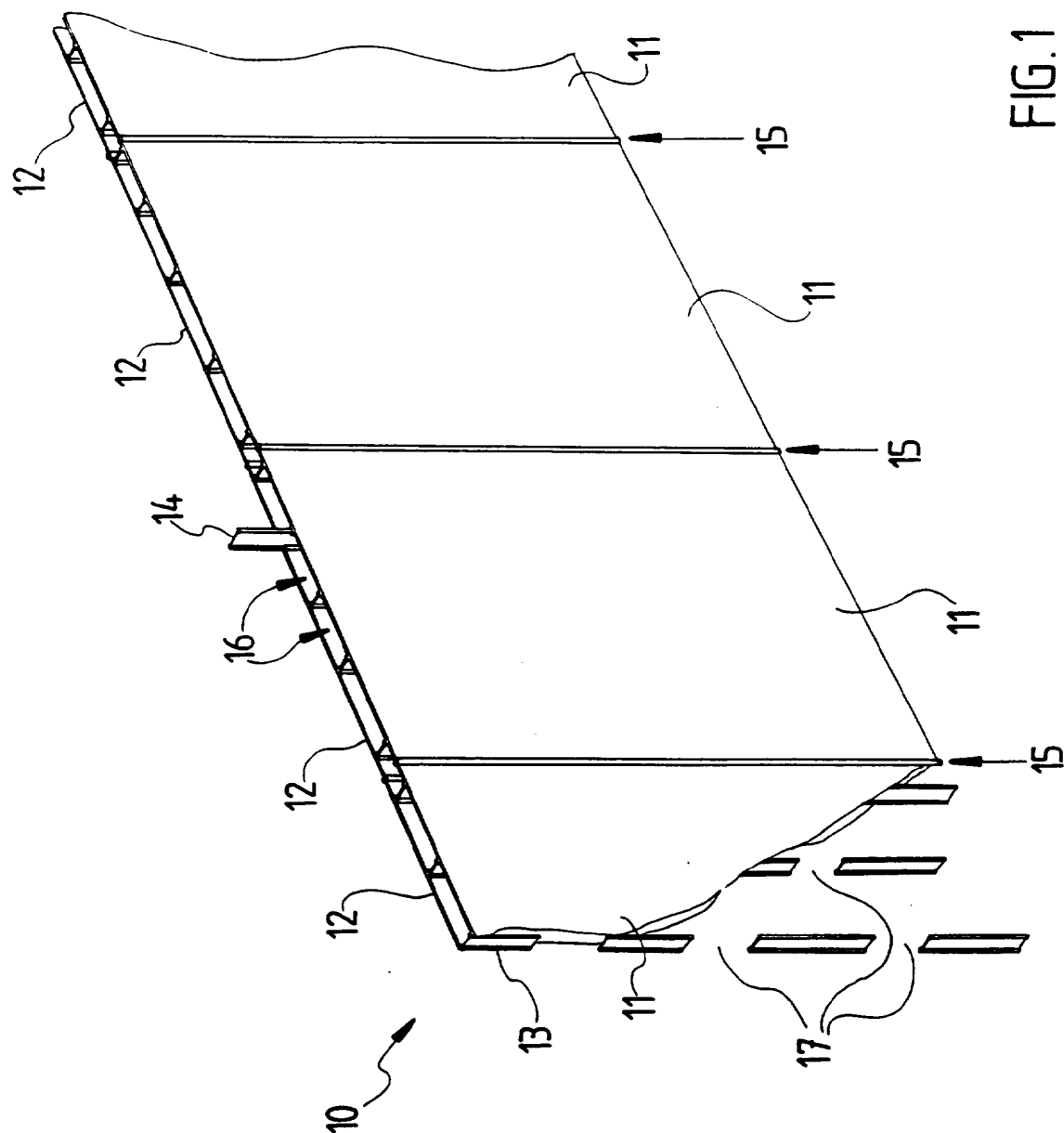
$\frac{1}{4}$ 

FIG. 1

SUBSTITUTE SHEET (RULE 26)

2/4

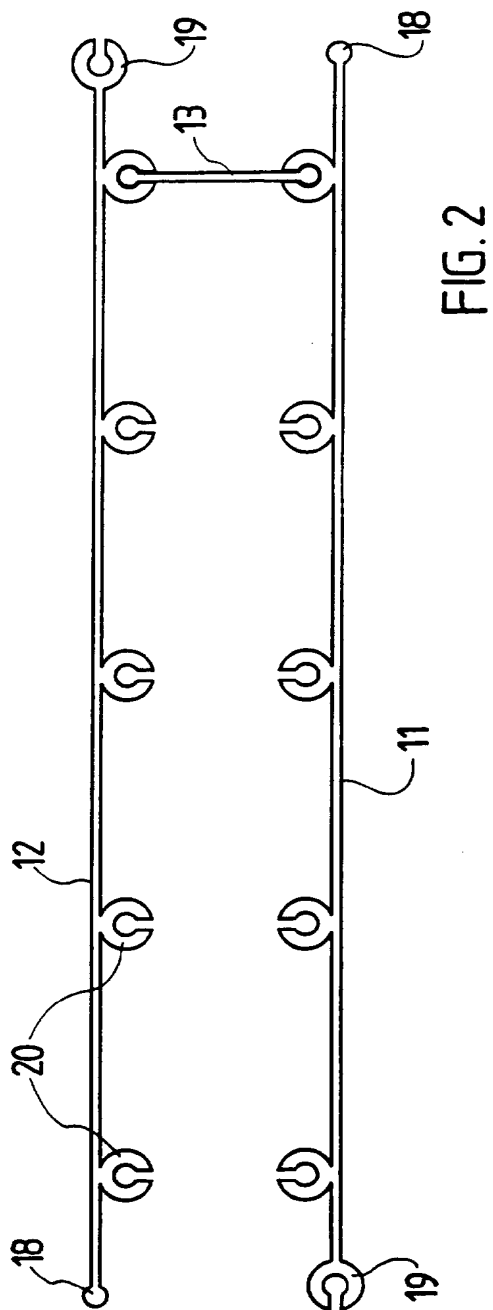


FIG. 3



FIG. 4



FIG. 5

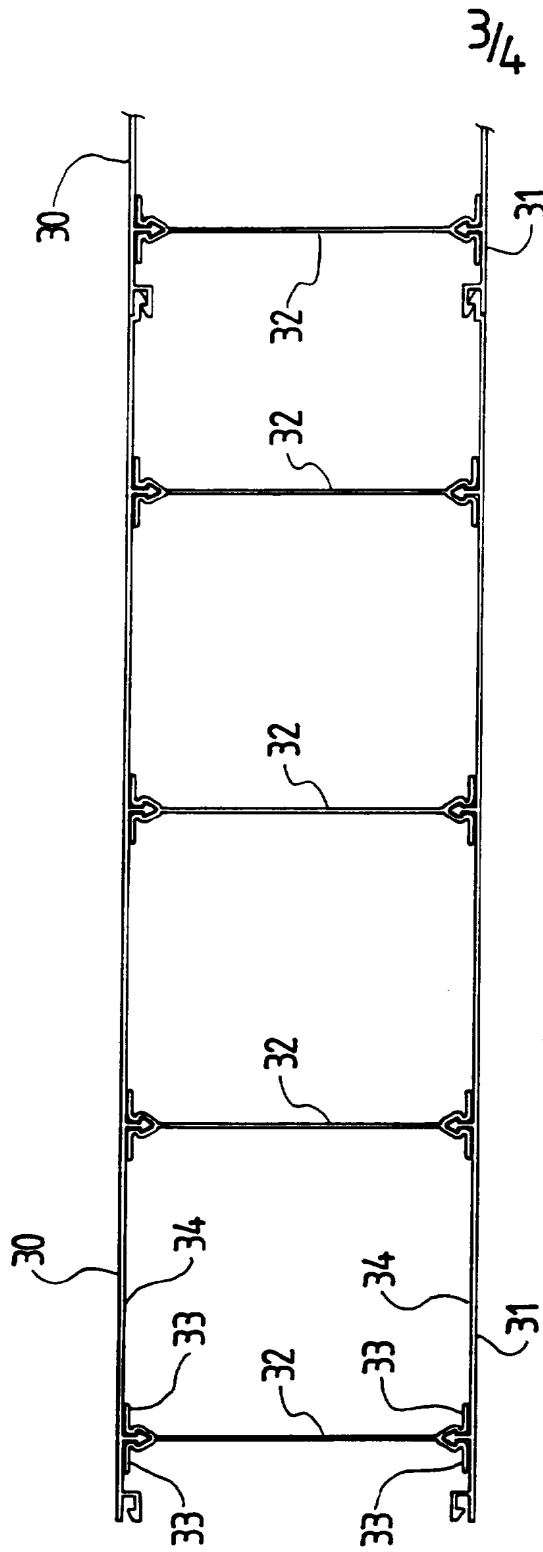


FIG. 6

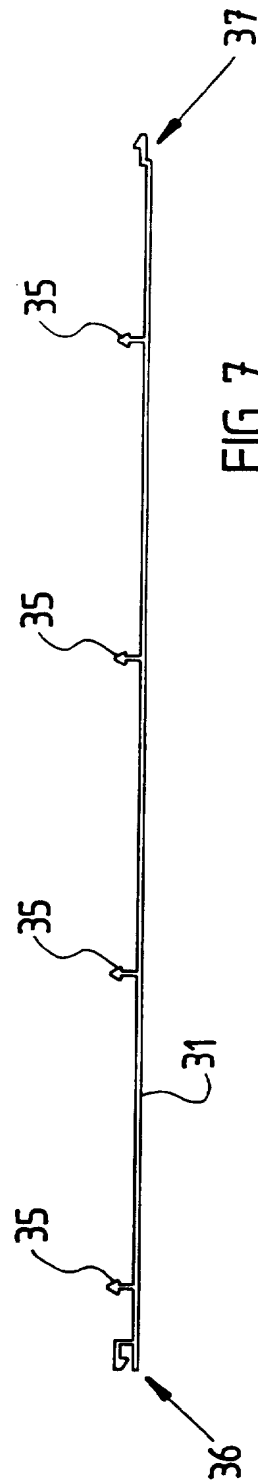


FIG. 7

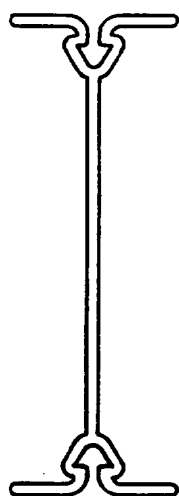


FIG. 9

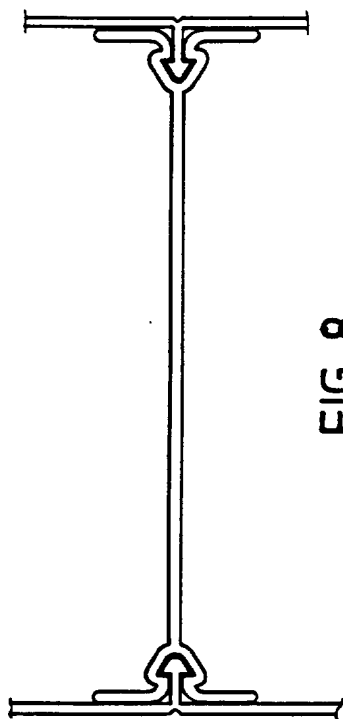


FIG. 8

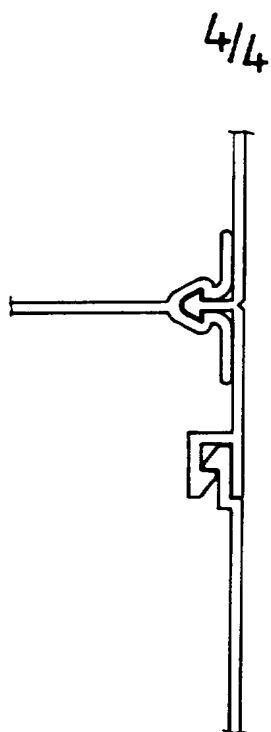


FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 95/00576

A. CLASSIFICATION OF SUBJECT MATTERInt Cl^B: E04B 2/32, 2/86; E04C 2/20, 2/36

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC E04B 2/00, 2/30, 2/32, 2/34, 2/86; E04C 2/20, 2/36

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DERWENT: (TIE: or SPACER: or CONNECT:) and (SHEET: or PANEL:)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 40783/68 A (PLASTIERS LIMITED) 22 January 1970 Page 5 lines 2-23 and page 6 lines 1-9	1-13
X Y	US 4706429 A (YOUNG) 17 November 1987 Figure 2, column 4 lines 44-48, column 11 lines 20-41	1-5, 8-10 6-7, 13
X Y	US 4698947 A (McKAY) 13 October 1987 Column 3 lines 1-42	1-4, 8-12 6-7, 13



Further documents are listed in the continuation of Box C



See patent family annex

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Date of the actual completion of the international search

18 December 1995

Date of mailing of the international search report

22 December 1995

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	AU 69723/74 A (ETABLISSEMENT COTAREX) 4 December 1975 Page 3 lines 5-29	1-4, 8-12 6-7, 13
X Y	US 4229920 A (LOUNT) 28 October 1980 Entire document	1-4, 8-10 6-7, 13
X Y	US 4866891 A (YOUNG) 19 September 1989 Column 2 lines 21-61, column 5 lines 13-49	1-5, 8-12 6-7, 13
X Y	US 4888931 A (MEILLEUR) 26 December 1989 Column 1 line 52-column 2 line 41	1-4, 8-10 6-7, 13
X Y	GB 1277816 A (ROHER-BOHM LIMITED) 14 June 1972 Page 1 line 78-page 2 line 59	1-4, 8-10 6-7, 13
Y	US 4332119 A (TOEWS) 1 June 1982 Figures 1-4	6-7, 13
Y	US 4635422 A (NOWACK et al.) 13 June 1987 Figures 3, 7 and 8	6-7, 13
P,Y	Patent Abstracts of Japan, M 1726, page 44, JP,A, 6-264540 (MITSUBISHI HEAVY IND LTD) 20 September 1994 See abstract	6-7, 13

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No.
PCT/AU 95/00576

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Patent Document Cited in Search Report				Patent Family Member			
US	4706429	CA	1283793	CA	1314727		
US	4698947						
AU	69723	AT	4225/74	BE	815722	DE	2328098
		DK	2953/74	FI	1652/74	FR	2231834
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US	4888931						
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US	4332119	CA	1089620				
US	4635422						
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